SEPT/OCT '85

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VOL. 1 NO. 6

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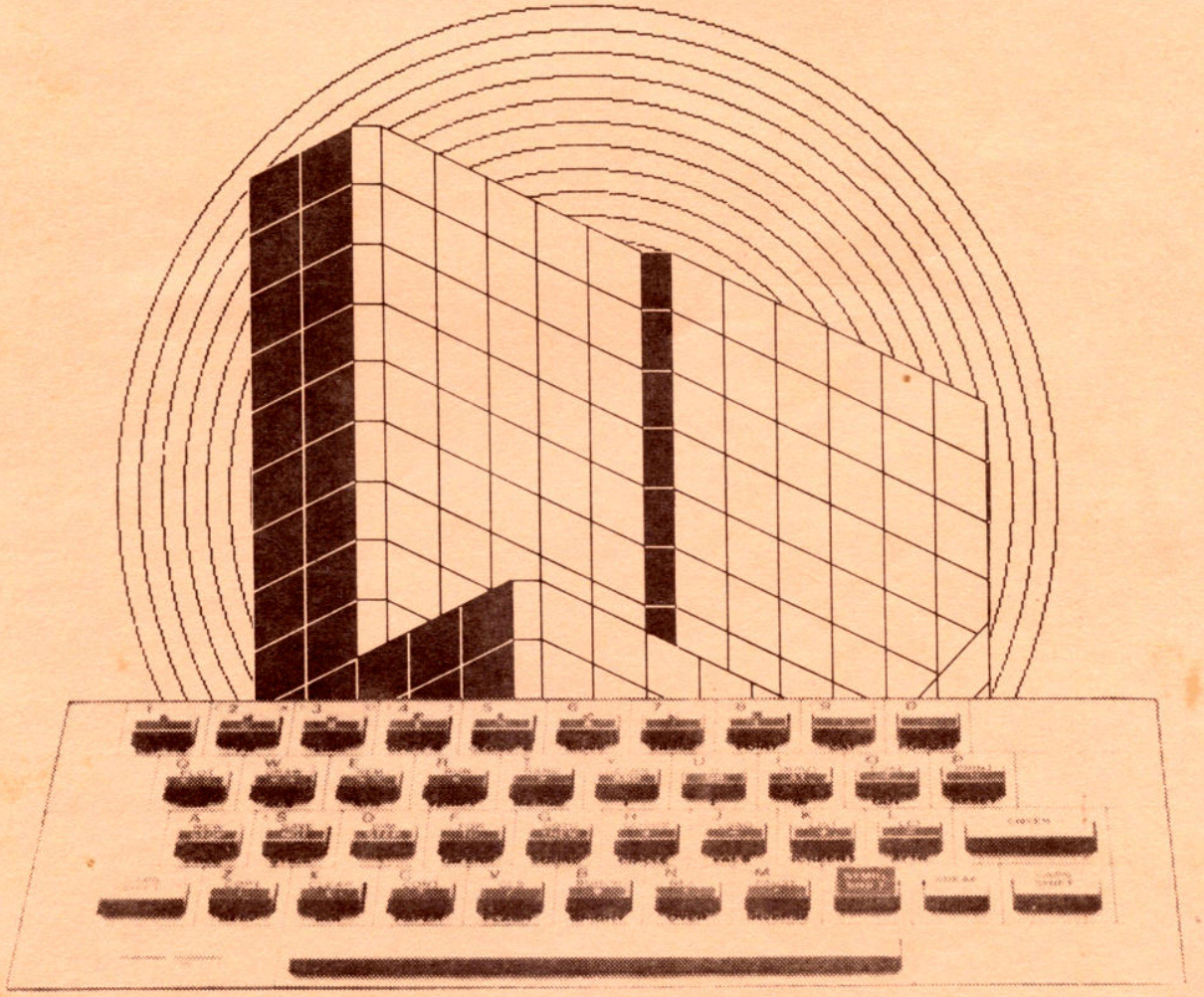
MAGAZINE



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SEPT/OCT '85
VOL.1 NO. 6

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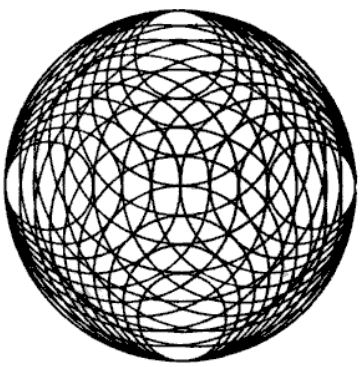
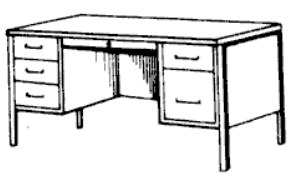


INSIDE



Editor's Corner

This issue I want to take a minute, and examine...just who are the people that use Timex/Sinclair computers? For my research, I conducted a very informal survey from the subscription and correspondence files of Time Designs Magazine. The results of this brief but non-scientific study may not suprise you at all. There is just about everybody represented from all walks of life...Doctors, Dentists, Truck Drivers, Students, Housewives, Teachers, Factory Workers, Retired Persons, Small Business Owners, Engineers and Corporate Executives.

Many T/S users have 1000's or ZX81's. Others have a 2068. A big percentage own both models. The reasons for purchasing a computer are also very diverse. They range from the development of hardware and software, educational applications, graphic design, conducting business, learning to program in BASIC, and most of all (everyone included)...to have good, clean, and honest to goodness fun!

I get a kick out of reading the comments sent by one particular gentleman. He states, "You know, I wouldn't trade my

little Sinclair for a truckload of Commodore or Atari's!"

Out of this large group of various backgrounds and interests, there is one thing in common. All have recognized what a friendly and really good computer a T/S is. It has been coined before, but the title People's Computer is appropriate.

Just who are the people that use T/S computers? It's people just like me and you! Let's keep learning and sharing together.

Last issue, you may have noticed that we didn't print any correspondence. Unforunately, we ran out of room. But here and now, we will make up for it and include several notes and letters that were sent the past few months. We will print as many as possible, but if we didn't get to yours, don't feel bad...just keep writing, we will get around to yours too.

LETTERS

Direct all correspondence to: The Editor c/o Time Designs
29722 Hult Rd., Colton, OR 97017

"Thanks for the TASWORD TWO tips (in the May/June 1985 issue). I have tried to use these in my Tasword Two PROBLEM. When I try to print double-spacing, ect; the program locks up! I do not have information for the 2040 printer per line feed, baud rate, ect. Would you care to have another article in TIME DESIGNS on the subject?? I appreciate any and all information on the T/S 2068. This area only has about ten owners of the 2068, so we have to rely on information such as T.D., for this. I also subscribe to the CTM, which is a very reliable publication.

Thanks for any help you and others may care to impart for us!

Sincerely,
W.E. Walker
Huntington, WV

[Editor- TASWORD TWO is probably the best-selling word processor for the 2068 to date. We will print any useful tip that is sent in. Hey Bill and Paul...have you discovered anything new?]

"Just a note to let you know that I am very pleased with the issue that has started my subscription. Also, I commend you on your feelings towards the use of manila envelopes (in the March/April '85 issue). With an attitude like yours, the magazine should go a long way. I certainly hope so..."

Brad Blanck
Honolulu, HI

"...I own a T/S 2068 and the 2040 printer. I would like to know more about how to program my machine in BASIC, how to program my machine in assembly, how to attach peripherals...for instance, I am intrigued by the Oki color printer (or even the Radio Shack color printer), but they sell the printer with a computer-specific $50 "connection package". Can we make our own with plans in your magazine? Can we interest them in making a series that would fit the 2068s? Can we modify an existing Atari or Commodore connection set? I am looking forward to receiving your magazine. Why haven't I heard of you before?"

Thank you,
Kenneth Martin
Wyoming, MI

[Editor- The Okidata "Okimate 10" color printer would be a very inexpensive way to produce hard copies of T/S 2068 color graphics. I have seen the printer go for as low as $115. You might get some help from the customer or service dept. at Okidata (532 Fellowship Rd., Mt. Laurel, NJ 08054, phone 609-235-2600), but it is unlikely. I know of a west coast users that sent in a petition to try and get a 2068 "Plug n Print" package developed. One of our readers may have some information on interfacing. Anyone?]

"Thanks for the issue #5 I received. As usual, another great issue. The article on T/S 2068 graphics was very informative.

A good addition to your magazine might be a column of programming tips and tiny programmes that show off how great a 2068 is. ...keep those issues rolling!"

Russell Ochocki
Winnipeg, Manitoba
Canada

[Editor- Hmmm, sounds like a very good idea Mr. Ochocki.]

"I have a copy of your Vol.1 No. 4 issue before me. On page 10 there is a machine code routine for joystick operation. It so happens that I have an almost identical program written 100% in BASIC, that was used in my classes to illustrate joystick operation and use. This BASIC routine is much shorter than the m.c. version in your article and provides diagonal motions to the player's piece in addition to horizontal and vertical motions. Moreover, it is just as fast because the speed of operation is limited by the GOTO loop that each uses. Mine also allows a second joystick to be added, if desired, with very little modification.

One other comment on this machine code routine. I have used a REM line for m.c. storage, but find that whenever the codes of control characters appear, an awkward situation arises with regard to automatic LISTing. For this reason, I use REM only, for storage of say UDG data, where such numbers might be avoided. If one does want to store m.c. in high RAM, consider the area in SYSTEM VARIABLES, starting at address 23756. There are 542 bytes available here that are not normally used. If these are used for storage, however, we must leave the loader portion of the program intact as otherwise SAVE becomes a two-step operation."

[Editor- This was the first letter we received from Mr. Fricke. Then...]

"The short, BASIC routine to which I alluded...is enclosed [see above]. This is a demonstration routine only, but it can be readily altered to incorporate into any game program. In this demo routine it is assumed that the joystick is plugged into the port on the player's left. Refer to Lines 20 and 25. RUN the routine. A "*" will appear at Row 10, Column 10. This asterisk can be moved in any one of eight directions by positioning the joystick. The action of the GOTO loop is fairly fast (hence Line 45), and the asterisk may repeat the movement too quickly. If so, a deliberate stepping action can be introduced by a line like...

```
17 IF STICK (1,1) 0 THEN GOTO 17
```

Now we must jog the paddle for each step. We can't use PAUSE 0 to step the action as

```
    2 REM ** JOYSTICK
             DEMONSTRATION
                  by
             Warren Fricke
    3
    5 LET C=10: LET L=10
   10 PRINT AT L,C;"*"
   15 LET LL=L: LET CC=C
   20 LET S= STICK (1,1)
   25 LET FB= STICK (2,1)
   30 LET C=C+(C<31 AND (S=8 OR S
=9 OR S=10))-(C>0 AND (S=4 OR S=
5 OR S=6))
   35 LET L=L+(L<21 AND (S=2 OR S
=6 OR S=10))-(L>0 AND (S=1 OR S=
5 OR S=9))
   40 PRINT AT 10,14;"FIRE"   AND
 FB=1
   45 PAUSE 5
   50 PRINT AT LL,CC;" " AND (LL<
>L OR CC<>C)
   55 GO TO 10
```

STICK can not release PAUSE like a keystroke does.

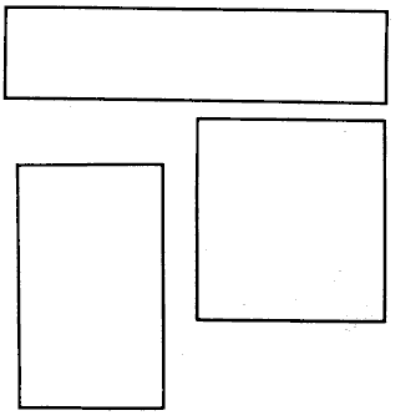
In this demonstration routine the fire button will print the word FIRE near the center of the screen when pressed. You can erase the word by running the asterisk thru it.

The conventional joystick produces a diagonal motion if the paddle is so positioned, but there is a drawback. The first step, before a diagonal one is taken, must be either vertical or horizontal. This is an inherent flaw in joystick design. To get a diagonal motion, two electrical contacts must be closed inside the joystick, and it is generally not possible to close them simultaneously. Hence, the motion starts off either horizontally or vertically, depending upon which switch closed first.

Very truly yours,
Warren Fricke
Depew, NY

[Editor- TIME DESIGN readers, look for more information and an original program on 2068 joystick control in the upcoming issue (Nov/Dec 85) from Mr. Fricke.]

BITS AND PIECES



MAXWELL DEAL FALLS THROUGH

In a suprising turn of events, the Robert Maxwell plan to buy-out Sinclair Research has back-fired. The earlier offer that was made this last summer (that had been accepted) was withdrawn. Therefore, the situation at Sinclair as far as ownership, remains unchanged. Sir Clive is still the Chairman, and still owns 83% of the common stock. The actual completion of the Maxwell/Sinclair deal never took place ...the papers were not signed, nor was any money exchanged.

In further related developments, the financial situation has improved for the time being. Dixons, a large chain-store in England, has purchased a substantial amount of Siclair merchandise, creating a positive cash flow. The "package" deal included both Spectrum and QL computers, and the Sinclair Pocket TV. The total deal was slightly less than 20 Million pounds worth of inventory, and will be spread out over a period of time. In other words, it was not all paid for at once, or shipped out at once.

Analysts are predicting large price cuts on Spectrums and QLs this November and December as a result of the Dixon purchase.

Rumors have it, in the British press, that some new Sinclair products are on their way...although Sinclair has strongly denied all intentions. The most prominent items of discussion are the 128k Spectrum (a super-powered version of the Spectrum Plus), and a battery-powered portable computer (that reportedly uses flat-screen TV technology and has the ability to upload/download files from a QL).

There is a biography of Uncle Clive and his rise to fame, that is about to be published in England. It is appropriately titled "The Sinclair Story". The author has held back from releasing the book, to monitor Sinclair's present situation. The book is reported to be a "rags-to-riches" account, and any drastic changes due to a shaky computer idustry, could possibly alter the outcome of "The Sinclair Story".

Here at home, the small staff at Sinclair/U.S. Operations is about to embark on a large ad campaign for the American version of the QL. There is a sizeable amount of product coming from Korea now, and QL sales are brisk.

PORTUGAL 2068 AND DISC DRIVE UPDATE

The highlight and headline-maker of the year has finally materialized. Two companies in the U.S. are currently selling the Portuguese Disk Drive System which is manufatured in a Timex factory for the 2068. Zebra Systems, Inc., 78-06 Jamaica Ave., Woodhaven, NY 11421, (718) 296-2385, has the drive system (entitled Zebra Disk Drive System) and also quantities of the required Hitachi-type 3 in. floppy disks. The English Micro Connection, 15 Kilburn Court, Newport, RI 02840, (401) 849-3805 has the drives for sale under the name "EMC Portuguese Disk Drive System". They also have the 3 in. disks, and the Portuguese 2068 computer. It is suggested that potential buyers of the 2068 Disk Drive System call or write these companies for current pricing and availability. Due to fluctuations in the International Money Market, prices may change. Also, supplies of these systems are somewhat limited at this time, and generally customers are put on a waiting list after pre-payment has been made.

The 2068 Disk Drive System will LOAD and SAVE American 2068 software like PRO/FILE and Tasword Two (U.S. version). It has a sophisticated, yet "user-friendly" operating system in ROM called TOS. It uses none of the 2068 RAM (since it has it's own), and commands are entered from the upper-row keys of the 2068 (like CAT, FORMAT, OPEN#, ect.). The drive system comes complete with interface, controller,

power supply, and one drive, is silver-colored and styled like the T/S 2068. Additional drives are also available.

A subscriber Bob Howard from West Covina, CA, passed this information along: "Your readers may be interested in knowing that I ran across an ad in RAINBOW, the magazine for the Radio Shack CoCo Two, closing out AMDEK 3 in. (Hitachi) dual-drives in case with power supply. Since these are the same as the Timex Portugal Drive for the TC2068, they represent a nice package for those thinking about an independent interface such as Aerco or John Oliger Co. John Oliger tells me that Ray Kingsley, who is programming the operating system EPROM, has a set of AMDEK drives, so they will be compatible for sure. The AMDEK deal is from SAGUAREO SOFTWARE, PO Box 1864, Telluride, CO 81435 (303) 728-4937. Now hold on to your hat! Price is $199 including cable and ten diskettes. The 10 Diskettes could cost as much as $80 alone by some sources as they are not the 3 1/2 inch Sony-type, that are at least $5.25 each too! Extra diskettes are $25 for 10. Note that this is a close-out, so may not last forever..."

AERCO DISC DRIVE SYSTEM

Dennis Jurries further comments on the AERCO FD-68 floppy disc interface had to be postponed an issue, as the newest DOS EPROM update arrived just a few days before going to press. Reportedly, the update contains the final "extensions-to-BASIC". Dennis has been experimenting with the system, and will give an account of what he has learned.

TELECOMMUNICATIONS

The twelve page User's Guide for the TIME (X) CHANGE BBS is now available for $1.00 (to cover postage and printing). Send your name and address, along with a buck to: Dave Clifford, 13910 Halldale Ave., Gardena, CA 90249. Dave has put a lot of work into the manual, and it covers topics such as "How To Log-on", Special Commands And Functions, Transferring Software, and an explanation of the MODEM/X-MODEM Protocol. The TIME (X) CHANGE is the "West's only BBS dedicated entirely to the Timex/Sinclair User". It is on-line 24 hours a day, seven days a week...and is free. Access telephone number is (213) 329-3922.

MEMOTEXT/MEMOCALC USERS GET NEWSLETTER

A newsletter published for Memotext and Memocalc users is available. "MEMO-NOTES" is published four times a year by The Syncware Group. Subscription price is $13.95 for a year. MEMONOTES is primarily written by Memotext "expert" Fred Nachbaur of Nelson, B.C., Canada. The first edition is ten pages, and crammed with all sorts of user tips and background information. Subscription orders should be directed to: MemoNotes c/o Thomas B. Woods, PO Box 64, Jefferson, NH 03583.

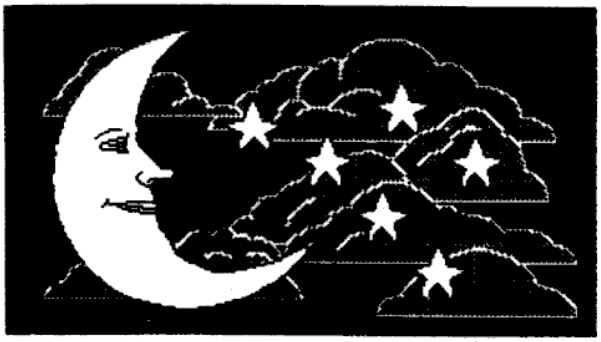
PRICES SLASHED

Both KNIGHTED COMPUTERS (707 Highland St., Fulton, NY 13069) and RAMEX (48945 Van Dyke Rd., Utica, MI 48087) have reduced their prices from previous catalog listings. For example, Knighted Computers had offered their popular "Fighter Pilot" and "Night Gunner" game programs for the 2068, for $19.95 each. New price is $16.95 each. Some of their Quicksilva programs are as low as $8.50. Ramex is offering similar discounts, but for a limited time only (Knighted Computer prices are more or less here to stay). For example, in the month of August, Ramex offered Tasword Two (a program that first sold for $49.95) for only $14.95. With prices like these, our T/S dollar goes a lot farther.

MORE NEWS IN
2068/SPECTRUM-WARES SECTION.....

A SUPERB HIGH-RESOLUTION GRAPHICS-DESIGN PROGRAM FOR THE ZX-81/TS 1000

PLUS AN EXPANDED AND VERSATILE VERSION FOR THE T/S 2068...



example 1

PABLO PIXEL-O

by Michael E. Carver

I have thoroughly enjoyed my ZX-81 for years. I have added a full-size keyboard, 64k of memory and the Timex/Sinclair 2040 Printer. I've always lamented the lack of high-resolution graphics, but have never felt compelled to invest the extra money for the needed hardware or s/w. The following program will allow you to use your ZX-81/TS 1000/1500 and either the Sinclair or Timex Printer to create high-resolution graphics (see examples 1-4). Good-bye "blocky" pictures!

The characters of the ZX-81 are generated using an eight by eight grid. Each line of this grid is stored as a binary number in the ROM (addresses 1E00h to 1EE7h). IF you were to PEEK the eight addresses for the letter "O" in the ROM, you would find the decimal/binary code in Fig. 1. For each "1" in the binary code, a pixel is set on the screen, producing the pattern "O".

Due to the design of the ZX-81, only codes stored in the actual ROM can be generated onto the screen without the use of extensive machine code programming. By using the routines contained in lines 500-570 and 1000-1090 of listing 1, and a lifted version of the LLIST subroutine from the ROM, any eight by eight character can be generated via your printer.

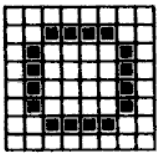
USING PABLO PIXEL-O

The program is designed for you to draw a picture and create individual characters to produce a high-res copy of it. Graph paper which is ruled in eight by eight grids will help you map out your characters. Draw or trace your picture onto the graph paper. Next, darken each square (pixel) which is a line or solid/shaded element of your picture. (NOTE: if your picture does not contain an empty 8x8 grid, you may wish to define an extra "space" character to help you in formatting later on.) Total up the number of different characters (8x8 pixel grid) you will need to compose your picture. Now count up the number of characters in each line (a max. of 32) and the number of character lines in your picture. You may wish to design your picture sideways and create a long panorama, but it can only be 32 characters high.

You are now ready to LOAD the program and begin creating your own characters. Before LOADing, you will need to lower RAMTOP by entering "POKE 16389,124", then followed by "NEW".

fig. 1

dec		binary
0	/	00000000
60	/	00111100
66	/	01000010
66	/	01000010
66	/	01000010
66	/	01000010
60	/	00111100
0	/	00000000



DEFINING CHARACTERS

When the menu appears, choose option 1-- "Define Characters" (see fig. 2). This will set up a blank array in which to store your data. Answer the prompt with the total you calculated earlier. You may wish to enter a total slightly higher than the amount of characters you wish to define, allowing for any errors or additions. When prompted, enter each line of the 8x8 grid as a space or an inverted space (GRAPHICS/SPACE...see fig. 3). When this character is produced by the printer, a pixel will be set (black) for each inverted space and unset (blank) for each space. If, after entering all eight lines, you are not satisfied, answer "NO" to the prompt and you will have the option of starting over for that character or changing individual lines. (Keep track of the order in which you define your characters as they are coded and stored in this order. Character code "1" is for the first character defined, code "2" the second defined, ect.) After you have completed your character definition, the screen will go blank for a few seconds while the computer analyzes and stores the data. If you would like to return to the menu during definitions, enter "M" as the first space in any line. This will allow you to check your progress or save your data. NOTE: To continue definitions, choose option 2 "Continue Definitions", as option 1 will clear all data from memory!

SEEING IS BELIEVING

You can review a portion of your work with "Big-Bits"--option 8. This option will display up to eight enlarged characters across and six down, using the standard Sinclair graphics. (See example 5) When prompted to enter

fig. 2

```
++++      FIELD  FILE-0      ++++
    DEFINE CHARACTERS.....1
    CONTINUE DEFINITIONS.....2
    PICTURE CODING.....3
    PRINT OUT PICTURE.....4
    SAVE.....5
    RE-DEFINE CHARACTER.....6
    CONTINUE PICTURE CODING..7
    BIG-BITS.....8
     ENTER ONE OF THE ABOVE
```

code numbers, enter the number for the character you wish displayed (remember, character 1 is the first character defined, 2 is the second, ect.). After entering the codes the screen will go blank while the computer stores this information on a "notepad". You will then see an enlarged version of the characters in the order you specified. By pressing "M", you can return to the menu, "Z" will make a copy of your enlarged characters on the printer. NOTE: The program uses part of the machine code stored in REM to set up the COPY routine in ROM, copying as many lines as are needed.

HARD EVIDENCE

To print a copy of your picture in high-resolution, choose option 3--"Picture Coding". Follow the prompts, by inputting the totals you calculated for the width and height of your picture. You will again be asked to enter codes for the newly defined characters in the order to be printed. After entering all of the character codes, you will be returned to the menu. If you only wish to print out a portion of your picture, entering "0" for a character code will return you to the menu. You may return to coding the picture by choosing option 7--"Continue Picture Coding". Option 4--"Print Out Picture" will produce a high-resolution picture via the printer. The monitor screen will go blank for a few seconds while the computer transfers data to a notepad, after which it will print out one line of your picture. This pattern will continue until all of the picture has been printed. After After you have finished "coding" your picture, a copy can be obtained at anytime by going directly to option 4.

fig. 3
PLOT OUT CHARACTER 1

HOW DID THAT GET THERE?

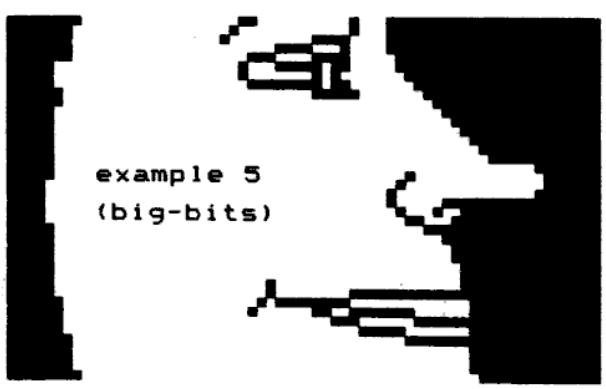
If you would like to correct or re-define a character, option 6 will allow you to re-define any character you designate. Re-define a character by following the steps for defining, line by line.

PRESERVING THAT MASTERPIECE

Option 5 will save the program and any data already entered. NOTE: if you break the program, do not RUN, as this will erase all of the data entered. Continue by entering GOTO 600, putting you into the menu. When you reload the program, the menu will appear and you may continue from there.

ENTERING THE PROGRAM - TS1000 version

Before entering listing 1, lower RAMTOP by entering POKE 16389, 124 and NEW. Line 1 should contain 113 characters after REM. When you have finished typing in the program, it is prudent to save it to tape before RUNing the program. After you have made a back-up copy, enter FAST mode and enter GOTO 9000. This will load the machine code into the REM statement. This subroutine will check for most typing errors while entering the machine code contained in A$. After the code has been transferred to the REM statement, you may delete lines 9010-9170. To save this completed version to tape, set-up your recorder to record and start the tape, enter as direct commands,



CLEAR and GOTO 3000. Remember, you will have to lower RAMTOP by POKEing 16389 with 124 before loading this program into the computer.

Listing 2 is a disassembled version of the machine code for the 1000 version. Addresses 16514-16529 contain the table holding the different graphic characters used by Big-Bits. The routine starting at 16530, looks at two lines of each character. It first looks at the first two bits in each line and calculates a matching character from the graphics character table, printing this graphic symbol. Then it moves on to the next two bits of each line, calculating and printing until all bits have been translated. This procedure is repeated until all eight lines of the character has been printed and then moves on to the next character. The routine at 16621 copies the screen to the printer. Register D is loaded with the number of screen lines to be copied. The routine then jumps into the ROM s copy routine.

BY THE NUMBERS

Line 1: Machine code for option 7 "Big-Bits"

Lines 2-3: Initializes flags

Lines 5-60: "Lifts" the LLIST routine from ROM and places it above RAMTOP with modifications.

Lines 100-130: Initializes array to store new character coding.

Lines 180-345: Accepts data for defined characters as a graphic binary code and changes the binary into decimal for storage.

Lines 350-390: Allows for corrections before storage of data is made.

Lines 400-495: Sets up picture array and accepts code numbers in the order you wish them printed.

Lines 500-565: Converts and stores character codes for printing of picture.

Lines 600-670: Contains the menu.

Lines 700-740: Sets up editing of already defined characters.

Lines 800-990: Subroutine which sets up data for the machine code for Big-Bits.

Lines 1000-1090: Stores the 8 lines of code for each character to be printed for each line of your picture and calls the LLIST routine store above RAMTOP.

Lines 2000-2040: Saves the program with any data entered.

Lines 9010-9170: Machine code loader.

Some of the Variables:

D(8): Holds decimal code for individual lines of character being defined.

D$: Blank line to mask or clear prompts printed to the screen.

I$(8,8): Accepts "plotted" version of character.

C: Total amount of characters to be defined.

C$(C,8): Stores CHR$ for the CODE of each line of defined characters. (By storing these codes in a $tring array we conserve memory. To store 100 characters using a numerical array would require 4K, opposed to 800 bytes using characters -- i.e. the number 53 is stored as "P".)

W & L: Width and Length, in characters, of you planned picture.

P(L,W): Contains character code numbers in the order to be printed.

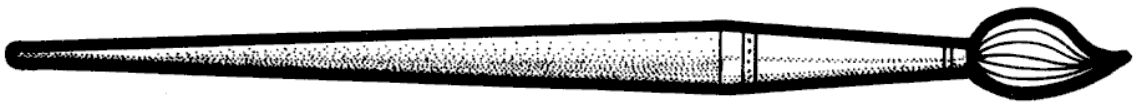
L(32,8): Stores the eight lines of each character for printing of one line of the picture.

B(6,8): Stores the character codes in the order to be displayed during Big-Bits option.

example 2

example 3

example 4



Listing 1

```
  1 REM AAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAABBBBBBBBBBBBBBBBBBBBB
BBBBBBBBBBCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCDDDDDDDDDDDDDDDD
  2 LET L=0
  3 LET H=0
  5 FAST
 10 FOR I=0 TO 112
 20 POKE 31744+I,PEEK (2161+I)
 30 NEXT I
 40 POKE 31800,63
 50 POKE 31857,201
 70 GO TO 600
100 CLS
105 DIM D(8)
110 DIM D$(32)
115 DIM I$(8,8)
120 PRINT AT 2,0;"HOW MANY CHAR
ACTERS DO YOU WISH TO DEFINE?"
125 INPUT C
130 DIM C$(C,8)
180 FOR F=1 TO C
200 PRINT AT 20,0;D$;D$;AT 5,6;
"1";AT 21,1;"12345678";AT 4,7;"
12345678"
205 CLS
210 PRINT AT 0,0;"PLOT OUT CHAR
ACTER ";(F AND NOT EDIT)+(H AND
 EDIT)
215 PRINT AT 20,0;D$;D$;AT 5,6;
1";AT 21,1;"12345678";AT 4,7;"
.2345678"
220 FOR A=1 TO 8
225 INPUT I$(A,1 TO 8)
230 FOR B=1 TO 8
235 PRINT AT 20,0;D$;" 12345678
"
240 IF I$(A,1)="M" THEN  GO TO
600
245 IF I$(A,B)=" " OR I$(A,B)="
" THEN  GO TO 260
250 PRINT AT A+4,7;"RE-ENTER"
255 GO TO 225
260 NEXT B
265 PRINT AT A+4,7;I$(A,1 TO 8)
;TAB 6;CHR$ (A+29 AND A<8)
270 NEXT A
275 PRINT AT 20,0;D$;D$;AT 20,0
;"ARE YOU SATISFIED?"
280 INPUT A$
285 IF CODE A$=51 THEN  GO TO 3
50
290 FOR A=1 TO 8
295 LET D(A)=0
300 FOR B=1 TO 8
305 LET D(A)=D(A)*2+CODE STR$ (
CODE I$(A,B)/128)-28
310 NEXT B
315 NEXT A
320 FOR P=1 TO 8
325 LET C$((F AND NOT EDIT)+(H
AND EDIT),P)=CHR$ D(P)
330 NEXT P
335 IF EDIT THEN  GO TO 600
340 NEXT F
345 GO TO 600
350 PRINT AT 20,0;D$;D$;AT 20,0
;"DO YOU WANT TO CHANGE INDIVID
UALLINES?"
355 INPUT A$
360 IF CODE A$=51 THEN  GO TO 2
05
365 PRINT AT 20,0;D$;D$;AT 20,0
;"WHAT LINE DO YOU WISH TO CHAN
GE?"
370 INPUT A
375 PRINT AT 20,0;D$;AT 20,0;"W
ORKING ON LINE ";A;AT 21,0;" 12
345678"
380 INPUT I$(A,1 TO 8)
385 PRINT AT A+4,7;I$(A,1 TO 8)

390 GO TO 275
400 CLS
401 PRINT AT 5,0;"HOW MANY SPAC
ES ACROSS WILL YOURPICTURE BE?
 (32 MAX.)"
403 LET RE=0
405 INPUT W
410 IF W>32 THEN  GO TO 400
415 PRINT AT 8,0;"HOW MANY LINE
S WILL BE IN YOUR  PICTURE?"
420 INPUT L
422 LET RE=1
425 DIM P(L,W)
430 CLS
431 PRINT AT 2,0;"ENTER CODE NU
MBERS FOR NEW","CHARACTER SET I
N THE ORDER YOU  WISH THEM TO B
E PRINTED."
432 IF A$="7" AND RE=1 THEN  GO
 TO 445
435 FOR Q=1 TO L
440 FOR R=1 TO W
445 IF Q>L AND R>W THEN  GO TO
600
447 PRINT AT 19,0;D$;D$;AT 20,0
;"LINE ";Q;" / SPACE ";R
450 INPUT P(Q,R)
455 IF P(Q,R)>=0 AND P(Q,R)<=C
THEN  GO TO 470
460 PRINT AT 19,0;"INVALID INPU
T.  RE-ENTER:::"
465 GO TO 450
470 IF P(Q,R)=0 THEN  GO TO 600

485 NEXT R
490 NEXT Q
495 GO TO 600
500 CLS
505 PRINT AT 2,0;"TURN PRINTER
ON AND PRESS ENTER WHEN READY T
O PRINT OUT YOUR  PICTURE."
510 INPUT A$
515 FOR A=1 TO L
520 DIM L(32,8)
525 LET M=0
530 FOR B=1 TO W
535 LET M=M+1
540 FOR N=1 TO 8
545 LET L(B,N)=CODE (C$(P(A,M),
N))
550 NEXT N
555 NEXT B
560 GO SUB 1000
565 NEXT A
600 CLS
605 LET EDIT=0
610 PRINT AT 2,0;"****  PABL
O  PIXEL-O  ****"
620 PRINT AT 4,3;"DEFINE CHARAC
TERS.....1";AT 6,3;"CONTINUE
 DEFINITIONS.....2";AT 8,3;"PIC
TURE CODING.....3";AT 10,
3;"PRINT OUT PICTURE.....4";
AT 12,3;"SAVE.....
...5";AT 14,3;"RE-DEFINE CHARAC
TER.....6";AT 16,3;"CONTINUE P
ICTURE CODING..7";AT 18,3;"BIG-
BITS.....8"
630 PRINT AT 20,4;"ENTER ONE OF
 THE ABOVE"
640 PAUSE 4E4
650 LET A$=INKEY$
660 IF CODE A$<29 OR CODE A$>36
 THEN  GO TO 640
670 GO TO 100+(105 AND A$="2")+
(300 AND A$="3")+(400 AND A$="4
")+(1900 AND A$="5")+(600 AND A
$="6")+(330 AND A$="7")-(30 AND
 (A$="7" AND L=0))+(700 AND A$=
"8")
700 LET EDIT=1
710 CLS
720 PRINT AT 2,0;"WHICH CHARACT
ER DO YOU WISH TO  RE-DEFINE? (
ENTER NUMBER)"
730 INPUT H
740 GO TO 205
800 CLS
805 DIM B(6,8)
810 PRINT AT 21,0;"HOW MANY LIN
ES? (6 MAX.)"
815 INPUT J
820 IF J>6 OR J<=0 THEN  GO TO
810
825 PRINT AT 21,0;"HOW MANY ACR
OSS? (8 MAX.)"
830 INPUT K
835 IF K>8 OR K<=0 THEN  GO TO
825
840 CLS
845 PRINT AT 2,0;"ENTER CODE NU
MBERS IN THE ORDER YOU WISH THE
M DISPLAYED."
850 FOR A=1 TO J
855 FOR B=1 TO K
860 PRINT AT 19,0;D$;D$;AT 20,0
;"LINE ";A;" / SPACE ";B
865 INPUT B(A,B)
870 IF B(A,B)>=1 AND B(A,B)<=C
THEN  GO TO 885
875 PRINT AT 19,0;"INVALID INPU
T.  RE-ENTER:::"
880 GO TO 860
885 NEXT B
890 NEXT A
895 LET NOTE=32000
900 FOR A=1 TO 6
905 LET M=0
910 FOR B=1 TO 8
915 LET M=M+1
920 FOR N=1 TO 8
925 IF B(A,M) THEN  POKE NOTE,C
ODE (C$(B(A,M),N))
930 IF NOT B(A,M) THEN  POKE NO
TE,0
935 LET NOTE=NOTE+1
940 NEXT N
945 NEXT B
950 NEXT A
955 SLOW
960 CLS
963 POKE 16622,J*4
965 RAND USR 16530
970 IF INKEY$<>"" THEN  GO TO 9
70
975 IF INKEY$="Z" THEN RAND USR
 16621
980 IF INKEY$<>"M" THEN  GO TO
975
985
990 GO TO 600
```

```
1000 FOR J=1 TO 32
1010 FOR K=1 TO 8
1020 POKE 32255+K+8*(J-1),L(J,K)

1030 NEXT K
1040 NEXT J
1050 FOR H=1 TO 31
1060 POKE 16444+H,H
1070 NEXT H
1080 LET HCOPY=USR 31744
1090 RETURN
2000 CLS
2010 PRINT AT 10,0;"ENTER NAME O
F PICTURE:::"
2015 INPUT A$
2020 IF A$="" THEN  GO TO 2000
2025 PRINT AT 10,0;"READY TO SAV
E PICTURE:    ";AT 12,0;A$;AT 14
,0;"TURN ON TAPE RECORDER","AND
 PRESS ENTER"
2030 INPUT X$
2035 SAVE A$
2040 GO TO 5
3000 SAVE "PABLO"
3010 GO TO 1
9010 LET ADDRESS=16514
9020 LET A$="0087048302850681018
6058203840780210070E5E10E040604
56235E23E5AFCB1217CB1217CB1317C
B1317218240856F7E2A0E407723220E
4010E3D5111D0019220E40D1E10D20C
FE5118OFF2A0E4019220E407EFE7620
BC11640019220E4023ED5B1040ED521
938ABE1C91618CD6B08C9"
9030 IF LEN A$<>226 THEN  PRINT
"ERROR IN A$ PLEASE  CORRECT."
9040 IF LEN A$<>226 THEN  STOP
9050 FOR X=1 TO LEN A$-1 STEP 2
9060 POKE ADDRESS+INT ((X-1)/2),
(CODE A$(X)-28)*16+CODE A$(X+1)
-28
9070 NEXT X
9100 LET CHECK=0
9110 LET ADDRESS=16514
9120 FOR X=0 TO 112
9130 LET CHECK=CHECK+PEEK (ADDRE
SS+X)
9140 NEXT X
9150 PRINT "YOUR CHECK IS ";CHEC
K
9160 PRINT
9170 PRINT "IF CHECK IS NOT EQUA
L TO 9525   LOOK FOR ERRORS IN
A$"
```

Listing 2

Address	Op Code (hex)	Mnemonic
16530	21007D	LD HL,32000
16533	E5	PUSH HL
16534	E1	POP HL
16535	0E04	LD C,4
16537	0604	LD B,4
16539	56	LD D,(HL)
16540	23	INC HL
16541	5E	LD E,(HL)
16542	23	INC HL
16543	E5	PUSH HL
16544	AF	XOR A
16545	CB12	RL D
16547	17	RLA
16548	CB12	RL D
16549	17	RLA
16551	CB13	RL E
16553	17	RLA
16554	CB13	RL E
16556	17	RLA
16557	218240	LD HL,16514
16560	85	ADD A,L
16561	6F	LD L,A
16562	7E	LD A,(HL)
16563	2A0E40	LD HL,(16398)
16566	77	LD (HL),A
16567	23	INC HL
16568	220E40	LD (16398),HL
16571	10E3	DJNZ,16544
16573	D5	PUSH DE
16574	111D00	LD DE,29
16577	19	ADD HL,DE
16578	220E40	LD (16398),HL
16581	D1	POP DE
16582	E1	POP HL
16583	0D	DEC C
16584	20CF	JR NZ,16537
16586	E5	PUSH HL
16587	1180FF	LD DE,65408
16590	2A0E40	LD HL,(16398)
16593	19	ADD HL,DE
16594	220E40	LD (16398),HL
16597	7E	LD A,(HL)
16598	FE76	CP 118
16600	20BC	JR NZ,16534
16602	116400	LD DE,100
16605	19	ADD HL,DE
16606	220E40	LD (16389),HL
16609	23	INC HL
16610	ED5B1040	LD DE,(16400)
16614	ED52	SBC HL,DE
16616	19	ADD HL,DE
16617	38AB	JR C,16534
16619	E1	POP HL
16620	C9	RET
16621	1604	LD D,4
16623	CD6B08	CALL 2155
16626	C9	RET

2068 version

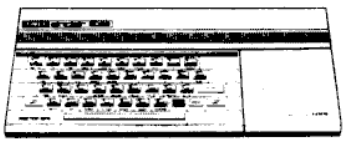
Listing 3 and 4 contain a version of PABLO PIXEL-O for T/S 2068 owners. There are a few enhancements in this version, made possible by the extended powers of the 2068 computer. Instead of storing our new characters in an array, we will store them in a table above RAMTOP and set the system variable pointing to the character table, to point to our new table (see line 125). Of course, we can have a screen display of our high-resolution picture. Also, when entering the codes for your printed picture, you are allowed the option of choosing seperate ink and paper colors for display. The POKE in line 220 sets the system variable controlling the cursor mode into graphics. Your REM statement in line 1 should contain 63 characters after REM. After entering the program, enter as a direct command, GOTO 9000. This will load the MC into the REM statement, checking for typing errors. You may then delete lines 9000-9199. Save the program by entering as direct commands, CLEAR and SAVE "pablo" LINE 10.

The program operates basically the same as the ZX-81 version. There is the added option of saving a copy of the screen after having displayed your picture. It is possible to define a new character set or font and point the system variables to point to this new set. (See the example 6) You may wish to incorporate this font into other programs.

example 6

sinclair

Listing 3

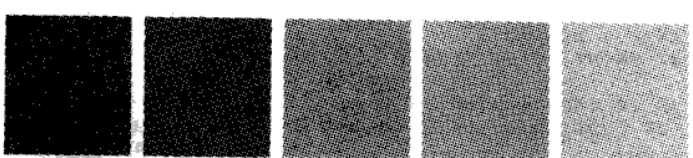


```
  1 REM aaaaaaaaaaaaaaaaaaaaaa
aaaaaaaaabbbbbbbbbbbbbbbbbbbb
bbbbbbbbb
 10 LET L=0: LET H=0
 60 GO TO 600
100 CLS
105 PRINT AT 2,0;"Do you wish t
o set up a blank   file?"
110 INPUT a$
115 IF CODE a$<>89 AND CODE a$<
>121 THEN  GO TO 600
120 PRINT AT 2,0;"How many char
acters do you wish to define?"
125 INPUT c: POKE  23728,c-INT
(c/256)*256:  POKE 23729,c/256
:  CLEAR  65367-(8*c)-384: LET
c=PEEK 23728+256*PEEK 23729
130 DIM i$(8,8): DIM b$(8,8): L
ET h=1: LET edit=0: DIM a$(10)
135 DIM d$(32): LET hcopy=0: LE
T option=0
145 LET chartable=65367-8*c-384

200 FOR f=1 TO c
202 PAPER 7: INK 0: BORDER 7: C
LS : DIM i$(8,8)
205 PRINT AT 0,0;"Plot out char
acter ";(f AND NOT edit)+(h AND
 edit)
210 PRINT AT 20,0;d$;d$;AT 5,6;
"1";AT 21,1;"12345678";AT 4,7;"
12345678"
215 FOR a=1 TO 8
220 POKE 23617,2: INPUT i$(a,1
TO 8)
225 FOR b=1 TO 8
227 PRINT AT 20,0;d$;" 12345678
"
230 IF i$(a,1)="m" OR i$(a,1)="
M" OR CODE i$(a,1)=156 THEN  GO
 TO 600
235 IF i$(a,b)=CHR$ 128 OR i$(a
,b)=CHR$ 143 OR i$(a,b)=CHR$ 32
 THEN  GO TO 250
240 PRINT AT a+4,7;"RE-ENTER"
245 GO TO 220
250 NEXT b
255 PRINT AT a+4,7;i$(a,1 TO 8)
;: IF a<8 THEN  PRINT TAB 6;a+1

260 NEXT a
265 PRINT AT 20,0;d$;d$;AT 20,0
;"Are you satisfied?"
270 POKE 23617,0: INPUT a$
275 IF CODE a$<>89 AND CODE a$<
>121 THEN  GO TO 335
280 FOR a=1 TO 8
290 FOR b=1 TO 8
295 LET b$(a,b)=("1" AND i$(a,b
)=CHR$ 143)+("0" AND (i$(a,b)=C
HR$ 128 OR i$(a,b)=CHR$ 32))
300 NEXT b
305 NEXT a
310 FOR p=1 TO 8
315 POKE chartable+((f-1 AND NO
 edit)+(h-1 AND edit))*8+(p-1)
,VAL (CHR$ 196+b$(p,1 TO 8))
320 NEXT p
322 IF edit THEN  GO TO 600
325 NEXT f
330 GO TO 600

335 PRINT AT 20,0;d$;d$;AT 20,0
;"Do you wish to change individ
uallines?"
340 INPUT a$
345 IF CODE a$<>89 AND CODE a$<
>121 THEN  GO TO 202
350 PRINT AT 20,0;d$;d$;AT 20,0
;"What line do you wish to chan
ge?"
355 INPUT a
360 PRINT AT 20,0;d$;d$;AT 20,0
;"working on line ";a;AT 21,0;"
12345678"
365 POKE 23617,2: INPUT i$(a,1
TO 8)
370 PRINT AT a+4,7;i$(a,1 TO 8)

375 GO TO 265
400 LET re=0: LET option=0: CLS
 : INPUT "How many characters a
cross will you picture be? ";w:
 IF w>32 THEN  GO TO 400
405 INPUT "How many lines will
be in you   picture? ";l
410 INPUT "Do you wish to input
 paper and  ink for each charac
ter? "; LINE z$: IF CODE z$=COD
E "y" OR CODE z$=CODE "Y" THEN
 LET option=1
415 LET re=1: DIM p(l,w): IF op
tion THEN  DIM a(2,l,w)
420 CLS : PRINT AT 2,0;"Enter c
ode numbers for new","character
 set in the order you  wish the
m to be displayed": IF z$="?" A
ND re THEN  GO TO 435
425 FOR q=1 TO l
430 FOR r=1 TO w
435 IF q>l AND r>w THEN  GO TO
600
440 PRINT AT 19,0;d$;d$;AT 20,0
;"Line ";q;" / Space ";r: INPUT
 p(q,r)
445 IF p(q,r)>=0 AND p(q,r)<=c
THEN  GO TO 465
455 PRINT AT 19,0;"Invalid inpu
t, re-enter!"
460 GO TO 440
465 IF option THEN  INPUT "Pape
r? #";a(1,q,r): IF a(1,q,r)>9 O
R a(1,q,r)<0 THEN  GO TO 465
470 IF option THEN  INPUT "Ink?
 #";a(2,q,r): IF a(2,q,r)>9 OR
a(1,q,r)<0 THEN  GO TO 470
472 IF p(q,r)=0 THEN  GO TO 600

475 NEXT r: NEXT q
480 INPUT "Paper color? #";pape
r: IF paper>9 OR paper<0 THEN
GO TO 480
485 INPUT "Border color? #";bor
der: IF border>7 OR border<0 TH
EN  GO TO 485
490 INPUT "Ink color? #";ink: I
F ink<0 OR ink>9 THEN  GO TO 49
0
500 BORDER border: PAPER paper:
 INK ink: CLS
510 INPUT "Do you wish a hardco
py? "; LINE z$: IF CODE z$=CODE
 "Y" OR CODE z$=CODE "y" THEN
LET hcopy=1
520 FOR a=1 TO l: FOR b=1 TO w
525 POKE 23606,(chartable+(p(a,
b)-1)*8)-INT ((chartable+(p(a,b
)-1)*8)/256)*256: POKE 23607,IN
T ((chartable+((p(a,b)-1)*8))/2
56)-1

530 IF PEEK 23689<3 THEN  POKE
23606,0: POKE 23607,60
535 IF option THEN  PRINT  PAPE
R a(1,a,b); INK a(2,a,b);CHR$ 3
2;
540 IF NOT option THEN  PRINT C
HR$ 32;: IF hcopy THEN  LPRINT
CHR$ 32;
542 IF NOT option AND PEEK 2368
9<4 THEN  PRINT CHR$ 8;: POKE 2
3606,(chartable+(p(a,b)-1)*8)-I
NT ((chartable+(p(a,b)-1)*8)/25
6)*256: POKE 23607,INT ((charta
ble+((p(a,b)-1)*8))/256)-1: PRI
NT CHR$ 32;
543 IF option AND PEEK 23689<4
THEN  PRINT CHR$ 8;: POKE 23606
,(chartable+(p(a,b)-1)*8)-INT (
(chartable+(p(a,b)-1)*8)/256)*2
56: POKE 23607,INT ((chartable+
((p(a,b)-1)*8))/256)-1: PRINT
PAPER a(1,a,b); INK a(2,a,b);CH
R$ 32;
545 NEXT b: PRINT
550 IF hcopy THEN  LPRINT
555 NEXT a
560 POKE 23606,0: POKE 23607,60
: POKE 23692,23
565 PRINT #1;"Z=COPY  M=MENU  S
=SCREEN$ SAVE"
570 IF INKEY$<>"" THEN  GO TO 5
60
575 IF INKEY$="s" OR INKEY$="S"
 THEN  GO TO 1000
580 IF INKEY$="z" OR INKEY$="Z"
 THEN  COPY
585 IF INKEY$<>"m" AND INKEY$<>
"M" THEN  GO TO 575
590 LET hcopy=0
600 BORDER 1: PAPER 1: INK 9: C
LS : LET edit=0
605 POKE 23617,0
610 PRINT AT 2,0; BRIGHT 1;"***
*      PABLO PIXEL-O       ****"
620 PRINT AT 4,4;"DEFINE CHARAC
TERS.....1";AT 6,4;"CONTINUE
DEFINITIONS....2";AT 8,4;"PICTU
RE CODING.....3";AT 10,4;"
PRINT OUT PICTURE.....4";AT 1
2,4;"SAVE.....5"
;AT 14,4;"RE-DEFINE CHARACTER..
...6";AT 16,4;"CONTINUE PICTURE
 CODING.7";AT 18,4;"BIG-BITS...
.....8"
630 PRINT  BRIGHT 1;AT 20,5;"EN
TER ONE OF THE ABOVE"
650 INPUT  LINE Z$
660 IF CODE Z$<49 OR CODE Z$>56
 THEN  GO TO 650
670 GO TO 650-(550 AND Z$="1")-
(448 AND Z$="2")-(250 AND Z$="3
")-(150 AND Z$="4")+(380 AND Z$
="5")+(50 AND Z$="6")-(230 AND
Z$="7")-(20 AND (Z$="7" AND L=0
))+(150 AND Z$="8")
700 LET edit=1
710 CLS
720 PRINT AT 2,0;"Which charact
er do you wish to  re-define? (
enter #)"
730 INPUT h
740 GO TO 202
800 CLS : DIM b(6,8)
805 INPUT "How many lines? (6 m
ax.) ";j
810 IF j<1 OR j>6 THEN  GO TO 8
10
815 INPUT "How many across? (8
max.) ";k
```

```
 820 IF k<1 OR k>8 THEN  GO TO 8
20
 830 PRINT AT 2,0;"Enter code nu
mbers in the order you wish the
m displayed."
 835 FOR a=1 TO j
 840 FOR b=1 TO k
 845 PRINT AT 19,0;d$;d$;AT 20,0
;"Line ";a;" / Space ";b
 850 INPUT b(a,b)
 855 IF b(a,b)>=1 AND b(a,b)<=c
THEN  GO TO 870
 860 PRINT  FLASH 1;AT 19,0;"Inv
alid input.  Re-enter."
 865 GO TO 850
 870 NEXT b
 875 NEXT a
 900 PAPER 7: BORDER 7: INK 0: C
LS : PRINT #1;"Note pad is bein
g loaded.        Z=COPY     M=MEN
U"
 902 LET note=64983: POKE 23659,
0
 905 FOR a=1 TO 6: FOR b=0 TO 7
STEP 2: FOR d=1 TO 8
 910 IF NOT b(a,d) THEN  POKE no
te,0
 915 IF b(a,d) THEN  POKE note,P
EEK ((chartable+(b(a,d)-1)*8)+b
)
 920 IF NOT b(a,d) THEN  POKE no
te+1,0
 925 IF b(a,d) THEN  POKE note+1
,PEEK ((chartable+(b(a,d)-1)*8)
+b+1)
 930 LET note=note+2
 960 NEXT d: NEXT b: NEXT a
 965 PRINT AT 0,0;: RANDOMIZE US
R 26731
 970 POKE 23659,2: POKE 26773,J*
32
 980 IF INKEY$<>"" THEN  GO TO 9
80
 985 IF INKEY$="z" OR INKEY$="Z"
 THEN  RANDOMIZE USR 26771
 990 IF INKEY$<>"m" AND INKEY$<>
"M" THEN  GO TO 985
 995 GO TO 600
1000 REM save screen$
1010 INPUT "Picture title:  ";a$

1020 SAVE a$SCREEN$ : GO TO 600
1030 CLS : PRINT AT 10,0; FLASH
1;"please note that you will ha
ve  to  enter CLEAR ";PEEK 2373
0+256*PEEK 23731;" before     lo
ading this program after      s
aving!
"
1035 INPUT "What is the title? "
;a$
1040 SAVE a$ LINE 2000
1045 SAVE a$CODE chartable,c*8
1050 GO TO 600
2000 LOAD a$CODE
2010 GO TO 600
9000 LET address=26715
9100 LET a$="8084888C8185898D828
68A8E83878B8F21D7FD06C0C5060456
235E23E5AFCB1217CB1217CB1317CB1
317215B66856F7ED710EAE1C110DEC9
F306C0CD050AC9"
9105 IF LEN a$<>126 THEN  PRINT
"Error in A$ please correct.":
STOP
9110 FOR X=1 TO LEN a$-1 STEP 2
9115 POKE address+INT ((X-1)/2),
(CODE a$(X)-(48 AND CODE a$(X)<
58)-(55 AND CODE a$(X)>64))*16+
CODE a$(X+1)-(48 AND CODE a$(X+
1)<58)-(55 AND CODE a$(X+1)>64)

9120 NEXT X
9125 LET check=0: FOR x=0 TO 62:
 LET check=check+PEEK (26715+x)
: NEXT x
9130 IF check<>7488 THEN  PRINT
"Look for errors in A$.": STOP

9135 IF check=7488 THEN  PRINT "
Machine code checks out."
```

Listing 4

Address	Op code (hex)	Mnemonics
26731	21D7FD	LD HL,64983
26734	06C0	LD B,192
26736	C5	PUSH BC
26737	0604	LD B,4
26739	56	LD D,(HL)
26740	23	INC HL
26741	5E	LD E,(HL)
26742	23	INC HL
26743	E5	PUSH HL
26744	AF	XOR A
26745	CB12	RL D
26747	17	RLA
26748	CB12	RL D
26750	17	RLA
26751	CB13	RL E
26752	17	RLA
26753	CB13	RL E
26754	17	RLA
26757	215B68	LD HL,26715
26760	85	ADD A,L
26761	6F	LD L,A
26762	7E	LD A,(HL)
26763	D7	RST 10h
26764	10EA	DJNZ,26744
26766	E1	POP HL
26767	C1	POP BC
26768	10DE	DJNZ,26736
26770	C9	RET
26771	F3	DI
26772	06C0	LD B,192
26774	CD050A	CALL 2565
26777	C9	RET



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TIME DESIGNS will publish examples of computer "art" using the PABLO PIXEL-O program supplied in this issue, in upcoming future issues. We may publish yours! Send artwork from either T/S 1000 or T/S 2068.

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ADVENTURES IN THE RAM JUNGLE AND OTHER MYSTERIES

by Earl V. Dunnington

In my article "Automatically Set RAMTOP Without Destroying The Program" published in the July-August issue, the GOSUB stack was very briefly discussed. This article will delve more deeply into this subject. I will also cover how to determine the extent of the "Safe Area" in the TS 1000 and 1500. The safe area determines the amount of bytes you can lower RAMTOP without interfering with the execution of the BASIC program. The safe area can be used for the temporary storage of data or machine code, without lowering RAMTOP. The safe area extends from the top of the Calculator stack to the bottom of the Machine stack.

There are three stacks in the upper RAM memory; the Calculator stack (C stack) the Machine stack (M stack), and the GOSUB stack (GS stack). All of these stacks are used by the routines in the ROM to store temporary data and variables. An item in the GS or M stacks consists of two bytes. The low byte is in the lower address and the high byte is in the next higher address. Items are added to the bottom of either the GS or M stacks. In the TS 1000 and 1500, the GS stack is located immediately below RAMTOP and above the M stack.

In the RAMTOP article we examined the four addresses below RAMTOP, using the PEEK command. A diagram of the values found in these four addresses is in Figure No. 1. In the same manner we examined the contents of the system variable ERR_SP and found that it pointed to the address RAMTOP-4. The TS 1500 Users Manual defines the system variable ERR_SP as the address of the first item on the M stack. The bottom of the GS stack is this address plus two (2). The Stack Pointer (SP) consists of two internal registers. The contents of the SP registers normally point to the address of the low byte of the last effective item on the M stack. The SP registers cannot be addressed from BASIC. Even using machine code, the contents of the SP registers cannot be determined immediately after the computer is turned on. For example, enter the following into your computer:

```
 1 REM 1234567
1Ø RAND USR 16516
2Ø PRINT PEEK 16514+256* PEEK
16515
```

then:

```
                Z8Ø assembler
POKE 16516,237  ED          : prefix
POKE 16517,115  LD(NN),SP   : Let 16514 and
POKE 16518,13Ø  N           : 16515=con-
POKE 16519,64   N           : tents of SP
POKE 16520,2Ø1  RET         : Return to
                            : Basic
```

Now RUN the program. The result on the screen is the address at which the SP registers are pointing after calling the machine code USR function. You can see

TS 1000 AND 1500
GOSUB AND MACHINE STACKS
AFTER TURNING ON COMPUTER

ADDRESS RAMTOP			
-1	62	HB	1ST ITEM
-2	Ø	LB	GOSUB STACK
-3	6	HB	1ST ITEM
-4	118	LB	MACH. STACK

S	P
ERR	SP

FIGURE NO. 1

that the function itself uses the M stack. Then how do I know that immediately after turning on the computer, the contents of the SP registers is the address of RAMTOP-4? Only by deduction from the disassembly of the ROM, GOSUB and RETURN routines. They would not work unless the SP registers were pointing to RAMTOP-4. The address in the ROM of the GOSUB routine is 3765d and of the RETURN routine is 3800d.

Figure No. 1 shows the situation after the computer is intialized and after each BASIC line has been executed. The one exception that I know about is after one or more GOSUB commands and before any RETURN command. For an example of the exception, enter the following lines into the computer (after entering NEW):

```
10 GOSUB 20
20 STOP
```

RUN the program. Using immediate commands, PEEK into each of the addresses from RAMTOP-1 to RAMTOP-6. Also PEEK the two bytes of ERR_SP, using the immediate command PRINT PEEK 16386+256*PEEK 16387. Your results should agree with the values shown in Figure No. 2. We must assume that the SP registers are also pointing to RAMTOP-6 as the ROM RETURN command routine would not work if this were not true. Looking at Figure No. 2, you can see how the GOSUB command has slipped the GOSUB line number plus one onto the bottom of the GS stack, moving the first item of the M stack down two addresses. A GOSUB line number plus one, once used, is written over by moving the first item on the M stack up two addresses and changing the pointers SP and ERR_SP. For example enter NEW and then enter the following lines into the computer:

```
10 GOSUB 30
20 STOP
30 PRINT "THE RETURN REMOVES THE GOSUB
LINE NUMBER +1 FROM THE GS STACK"
40 RETURN
```

RUN the program. If you PEEK the four addresses below RAMTOP and ERR_SP you will find that their contents are again the same as Figure No. 1. If the two bytes of the first item on the GS stack (0 and 62) and the two bytes of the first item of the M stack (118 and 6) are in conjunction as in Figure No. 1, and a RETURN command is encountered in the BASIC program, then an error report 7 (RETURN without a corresponding GOSUB) is generated. The ROM routine tests only for the high byte 62. As 62*256=15872, this is beyond the normal maximum line number 9999. It is possible to use higher line numbers by working from the top of the program and POKEing 16509 with the high byte of the line number and POKEing 16510 with the low byte as each line is entered with a normal line number. In this case, line numbers with a high byte of 62 must not be used with a GOSUB command. If the two bytes of the first item on the GS stack and two bytes of the first item on the M stack are seperated by the two bytes of a GOSUB line number+1, then the next line after the GOSUB line is executed when the RETURN command is encountered.

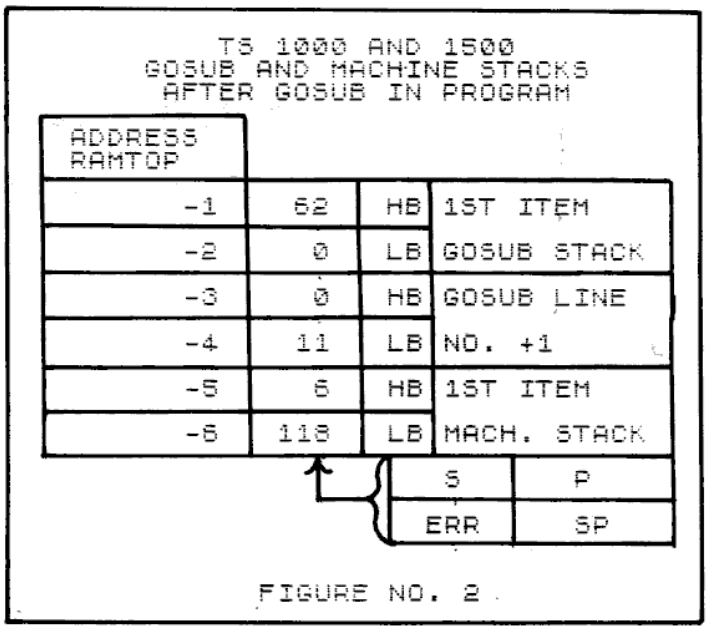


FIGURE NO. 2

What is that 118 and 6? To find out, we know that an item on the M stack consists of two bytes, the low byte in the lower address and the high byte in the higher address. So 118+256*6=1654. The addresses in the ROM run from 0 to 819d. Let us use the 1654 as an address in a machine code program and see what happens.

```
 1 REM 123
10 RAND USR 16514
20 PRINT "THE ADDRESS 1654 STARTS THE
EXECUTION OF THE NEXT BASIC LINE OF THE
PROGRAM"
```

Now in the immediate mode, POKE the following into the REM line:

```
                    Z80 assembler
POKE 16514,195   JP NN   : GOTO
POKE 16515,118   N       : 118+
POKE 16516,6     N       : 256*6=1654
```

RUN the program and you will see the answer on the screen. Note that using a 118 in the machine code messes up the display, but the program still runs.

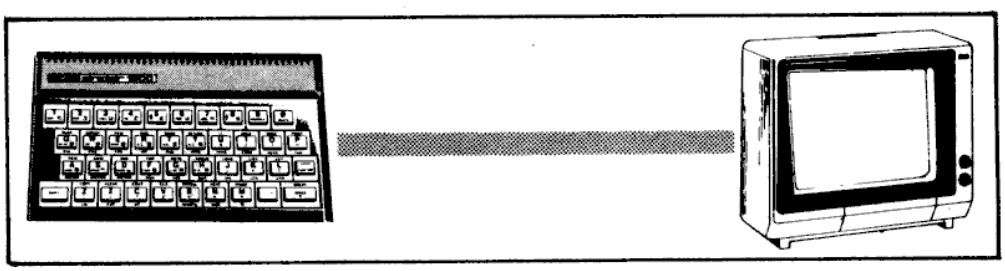
Since the M stack expands downward in memory as items are added to it or to the GS stack and then, in effect, contracts as items on the stacks are no longer needed, but not withdrawn, a trail of garbage is left behind. This garbage is written over the next time the stack expands. Turn off your computer and then power up again. Using the immediate command, PEEK into the address that is the value of your RAMTOP minus 50. You should find 129. PEEKing below this address you will find only zeros. (Unless you PEEK all the way down to the top of the Calculator stack. This means that in the itialization ROM routine, the M stack was expanded down to this address. Now enter and run the following program, changing line 10 to the applicable values for your RAM memory:

```
10 FOR N=(your RAMTOP-50) TO (your RAM-
TOP-5)
20 POKE N,0
30 PRINT PEEK N;" ":
40 NEXT N
```

What happens is that between the time 0 is poked into the M stack and the value at address N is peeked, the M stack is being used by the ROM routines which are much faster than BASIC. PEEK again, using the immediate command, into the address of your RAMTOP-50. Once again the value at that address is not 0 but 129. Peeking below that address there are only zeros. From this we can deduce that coming out of a BASIC program, the ROM routines use the M stack down to RAMTOP-50 and that the little program did not expand the M stack below this point. So the upper limit of the safe area for this program is: RAMTOP-51.

A MONITOR ADAPTER FOR THE T/S 1500

by Dick Wagner



For several years, publications have carried articles on connecting T/S 1000 and ZX81 computers to monitors, to improve the quality of screen image that some TVs lack. There have been mainly 2 approaches, (1) install a complex converter to give a reverse screen image of white on black, (2) install a simple transistor adapter to match the computer output to the low impedance of the monitor. This gives a normal screen. Number 2 is the easiest and the method is described. On a T/S 1000, the procedure is to tap pin 16 on the Sinclair special IC.

The literature seems to have neglected the T/S 1500. Possibly because the RF modulator is special, or possibly because of the weak signal provided by the newer SCL IC. The writer has converted two T/S 1500 computers with satisfactory performance; one with a B&W Zenith monitor, and one with a NEC color monitor.

This article is not a detailed instruction of my method, so if the reader is not well versed in handling circuit boards and components, it is recommended that you get help from a member of your users group, an amature radio operator, or

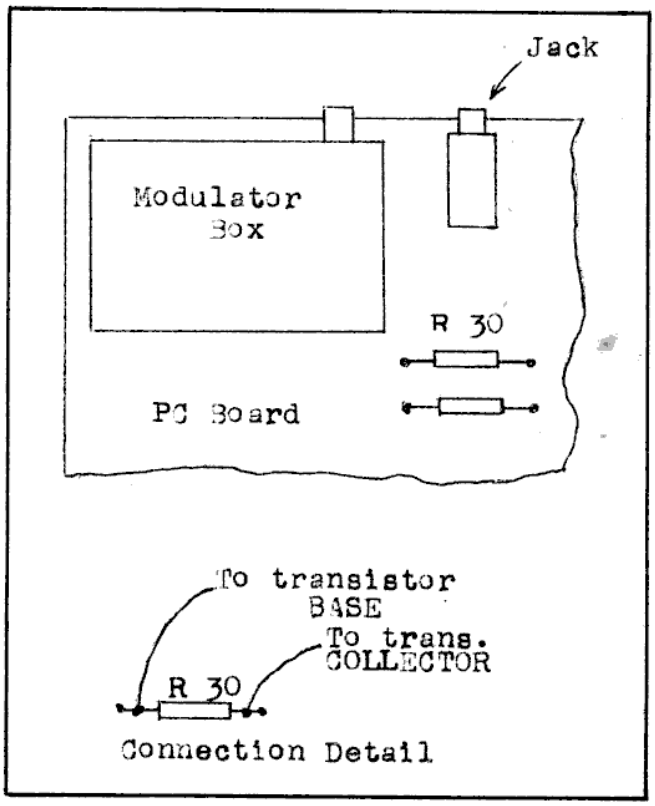
someone in the radio and TV service business.

Only a few parts are required. The first step is to obtain the transistor, resistor, cable and phono plug or jack, and some wire. The transistor is type 2N2-222 which is Radio Shack number 276-2009. The resistor is a 1/4 watt 220 ohm size, but may be 270 to 330 ohms. The phono jack can be R-S type 274-337 if the T/S cable is to be used for monitor connection. A short shielded audio cable (6-8 inches) will provide the computer connection with the jack on the free end. If it is desired to install a single cable to the monitor, then use R-S 42-2370. This provides a matching plug to fit the monitor jack.

To assemble the adapter, fit the resistor to the flat of the the transistor, cutting one wire lead to solder to the emitter lead, close to the transistor's body. Trim close to the solder connection if the resistor lead protrudes. Do not cut the transistor lead at this time.

Strip the outer insulation from the audio cable, about 3/4 in., and twist the shield wire together. Strip 1/8 in. from the core insulation and solder the center wire to the emitter lead. This lead should be insulated and brought parallel with the resistor. Cut excess wire from this connection. The other end of the resistor should be soldered to the twisted sheild of the audio cable. These connections will give an output from emitter and will also ground the resistor. The resistor connection should be close to the cable, to leave the twisted shield for another connection. Using two light-insulated wires (like 30 gauge wire wrap), make your connections to the transistor base and collector leads after they have been shortened. These two wires can be 2-3 inches long. Follow the lead positions as per R-S package.

The assembled module should be insulated so no bare wires are exposed. Wires within the module also should be insulated from each other. Heat shrink tubing or plastic tape can be used. The assembly should have two leads of light gauge wire coming out of one end. These should be marked some way...the transistor collector is +5 volts and the base lead. The other end has the signal out and the ground wire (shield). The shield can have a short but heavier wire (20-24 gauge) soldered to it at this time. This will be a ground wire and a strain relief.



Disassemble the 1500 case by removing five screws and carefully remove the two ribbon cables from their connector blocks. then remove one screw to release the circuit board from the base. With the component side up, determine the location of resistor R30. It is close to the inside corner of the modulator box. Connections will be made to each end of this resistor. The end closest to the modulator box will be connected to the base of the transistor and the other end is +5 volts. See the diagrams for location.

Now make the connections noted above. Be sure the leads are correct before soldering. Solder with light heat, so the circuit board connections will not be damaged as a result. Cut the ground wire short, so when soldered to the ground connection for the jack, it will bring the module close over the jack. The other wires must be slack. Now apply power to the board and connect to the monitor. The cursor will show on the screen if everything is OK.

Exit to the rear when the circuit board is installed in the bottom of the case. Decide how to make the exit thru the top rear. If the cable is small enough (1/8 in. dia.) then it can use the same notch for the modulator cable. Light filing may be required to get around the modulator box. If the cable is heavier, file

a notch in the back between the jack and modulator box. Connect the keyboard cables using needle nose pliers. Be most careful not to bend the cables sharply. If a cable is damaged, noted by a crack in the trace, use a sharp knife to separate the insulator cover on the cable. About 3/16 in. will do, and trim with some sharp thin scissors. Cut the cable at the crack so there will be a new end.

For further reference:

The Explorers Guide To The ZX81
The Best Of Sync
Sync Vol. 3 No. 4
SyncWare News Vol. 1

HARDWARE

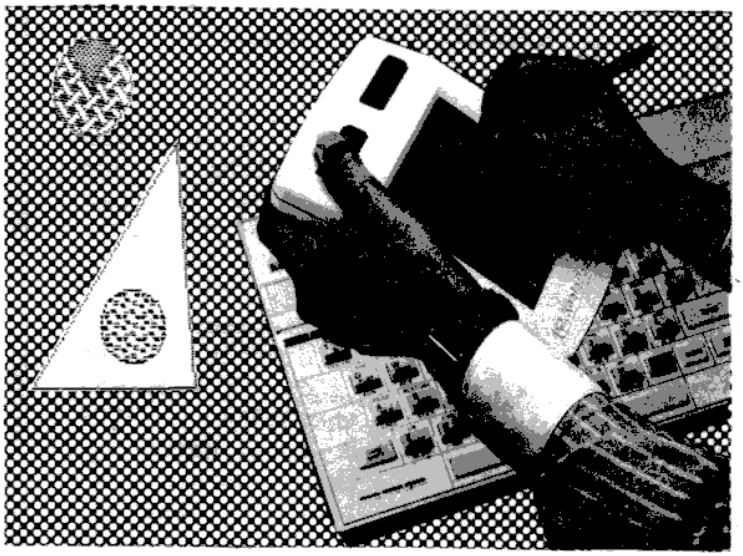
ZEBRA GRAPHICS TABLET FOR 2068

reviewed by Dennis Jurries

Have you been looking for a way to do screen displays easier than figuring the PLOT and DRAW positions? This may be the way to accomplish the task. The ZEBRA GRAPHICS TABLET is the same one that you may have seen for other computers (also known as the KoalaPad). The system for the Timex/Sinclair 2068 comes with a software program on cassette called "ZPAINT", and a small interface with two RS-232 type (DIN) sockets.

The ZPAINT program allows you to draw pictures using a pen type (narrow one-pixel width) stroke, or a brush type (wide width) stroke. The basic 2068 colors can be used to draw the border and then to "draw" in color. CIRCLE is used by selecting that option and placing the cursor (with the use of the supplied stylus) at the location of the center of the circle, and pressing one of the buttons on top of the Graphics Tablet. Then by placing the cursor at the location of the circumference of the circle and pressing the button a second time, the circle will be drawn automatically. The "pen", and to a certain extent, the "brush" option, put extraneous pixels or "marks" on the screen. However, these can be cleaned up by selecting the white color and redrawing over the marks.

I also had the opportunity to use the "TECH DRAW" and "CIRCUS COLORING BOOK" software programs (supplied as a free bonus with Graphics Tablet purchase). Although the TECH DRAW program only draws in black and white, it has many more features than ZPAINT. There are six separate menus, one for drawing, one for brush selection (sixteen possible types), one for shading (thirtyfive possible patterns), a Text menu, a Line menu, and an I/O menu (to select printer type, LOAD or SAVE screen). This program is fantastic, but has the erroneous mark problems that ZPAINT has... and must be corrected the same way. See the attached figures. Figure number one is the emblem of the Clackamas County Area Timex/Sinclair User's Group. The next figure (no. 2) shows an attempt (incomplete) at tracing the same emblem in a larger size. No corrections were made. You can see that the fine brush size made more erroneous marks. These marks can be cleaned up, and I believe that with more practice and experience with the Graphics Tablet (and TECH DRAW), great improvements in the figures that are drawn can be made.



Actual "doodlings" using the Zebra Graphics Tablet

The CIRCUS COLORING BOOK software has several screen pictures dealing with the

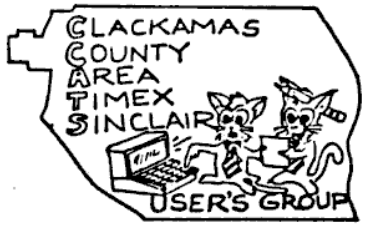


figure no. 1

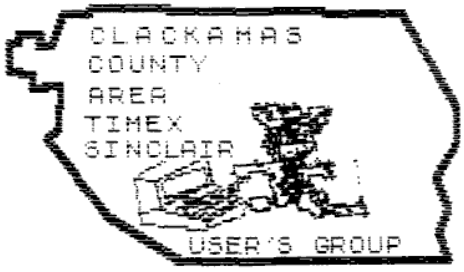


figure no. 2

circus in it. The object is to color in the pictures. This program could keep young children busy for several hours, but outside of that, I can find no pratical use for it.

I took TECH DRAW and COLORING BOOK to the last User's Group meeting, and showed two kids aged between 8 and 12 some of the basic commands. Two hours later they were showing me features that I didn't know how to use yet! All in all, the ZEBRA GRAPHICS TABLET and TECH DRAW are excellent, and can be of great help to those who are using a lot of screen displays. It can be fun too.

The Graphics Tablet is available from Zebra Systems, Inc., 78-06 Jamaica Ave., Woodhaven, NY 11421. Phone (718) 296-2385. Price is $89.95 and with each purchase, a free TECH-DRAW software cassette is included.

SOFTWARE

ZIP BASIC COMPILER

reviewed by Michael E. Carver

The resident language in the T/S 2068 is Sinclair BASIC (an altered version of Microsoft BASIC). BASIC is a relatively easy language to learn and thus an easy means of communicating with the microprocessor. The microprocessor can perform approximately 1/2 a million operations per second. Then, why is BASIC so slow? The processor only uses two numbers (1 and 0). Most humans cannot easily communicate or think in pure binary, and thus we need other "languages" in order to talk with our computer. Many microprocessor operations are lost while the computer laboriously translates from BASIC into machine code. Most programs you buy (especially games) are programed in machine code, bypassing BASIC, and are 100's of times faster than any BASIC program you can write. Enter the compilers...

Compilers translate programs written in BASIC into machine code, eliminating the need to re-translate each time the program is run. ZIP is a program available for the T/S 2068 which can convert BASIC programs into fast-running machine code. The manual included with ZIP contains benchmark results (run on the Sinclair Spectrum) of BASIC vs. a British version of ZIP, showing speed ratios from 111:1 to 213:1. ZIP is an integer-based compiler (i.e., it only uses whole numbers--no fractions or floating point arithmetic). This compiler is an enhanced version of one published in the British magazine, "Your Spectrum".

As an integer-based compiler, there are many commands which are not available. There are no mathematical functions available beyond +,-,*,/. You will not be able to compile programs containing any trigonometry functions (TAN, COS, SQR, ect.). Numbers are limited to the range of -327 67 to 32767 (though the range of +/- 65535 is allowed if these numbers are not PRINTed, multiplied or divided). There are many other Keywords you may find necessary in some programming which also cannot be compiled. Unfortunately, the manual does not list all of the commands which are not allowed. Trial and error and some common

sense must be your guide. Some of the other commands which are not compilable are: READ, DATA, DEF FN, CIRCLE (nor arcs using DRAW-though straight lines with DRAW is acceptable), SCREEN$, SAVE, LOAD, BEEP, RND, INKEY$. Some programmers will find the absence of character strings a major drawback. With proper programming, one can overcome many of these shortcomings (i.e., store character codes in a numerical array and print them with a FOR/NEXT loop using PRINT CHR$ A(X)). You are limited to 26 single-letter variables and 26 single-dimensioned arrays. Arrays must be DIM'ed with the program listing by constants and cannot be re dimensioned, as their storage area is reserved during compilation. The manual does includs routines to simulate INKEY$, RND, BEEP and STICK. It is also possible to access BASIC or machine code routines from within a compiled program.

The manual states there is room for a "little under 13k" of a BASIC program for compiling, occupying lines 1-4999. In actuality, I found there is only room for about 10.7k, but this left insufficient memory for ZIP to compile. I had to reduce the BASIC program to about 8k before ZIP could completely compile my program. There is approximately 10.5k of memory to store a compiled program and variables. ZIP also includes an "optimizer", which provides for faster running programs. According to the manual, removing this from the package will allow about 2k more of BASIC for compiling. Again I found this to be an overstatement. After removing the optimizer, I only discovered about 1K available.

Programs that are compiled by ZIP run at speeds approaching those of well-written machine code, but actual compiling can be a slow process. of course, you will have hopefully removed all bugs by testing the program in BASIC and will only have to compile once. Included with ZIP is a demo game (written in BASIC) to be compiled using ZIP. The listing of the demo game is a little over 3k and took about 31 min. to compile. (It appears that ZIP is written entirely in BASIC.) First there is a check of the BASIC itself. Checks are made for correct KEYWORDS and any translation is done before actual compilation begins. There are seven error reports possible during this stage and any illegal KEYWORDS are pointed out, allowing correction before continuing. This process took about 6-3/4 min. to complete. The rest of the time was involved in converting the 3k of BASIC into appoximately 3k of mc. Error reports are also provided during the final stage of compiling.

Aside from the differences in the amounts of memory available, I found that ZIP lived up to its claims. It is fairly easy to use and "user friendly" with its error messages. If the Timex ROM discovers a syntax error while running a compiled program, you will receive a normal Sinclair BASIC error report. It will not reort the exact location of the error, only its nature.

ZIP is not a program for a novice BASIC programmer. One who knows how to manipulate a limited BASIC into a code that produces expanded results is best suited as a ZIP user. For those of you who would like to market a program, but feel your knowledge or the time involved in developing machine code is holding you back, the authors of ZIP allow you to sell any programs compiled by ZIP, no fees required...or perhaps you just want to speed up some of those interesting (but slow) BASIC programs in magazines or books...then ZIP may be for you. Before committing yourself to any particular compiler, be sure you can live with its limitations. (Note: There are very few compilers available for the T/S 2068. I know of a few available for the Spectrum, on which can handle strings and multi-length variable names, but not FOR/NEXT loops.)

Though ZIP was not designed as a machine code tutor, I found it can be quite the instructor. One can compile a series of BASIC commands and using a monitor, disassemble the compiled code, and receive some enlightening lessons in writing mc routines.

ZIP comes in a book sized plastic case with one cassette (containing ZIP and a demo game) and documentation. I had no problems in loading my copy on the first attempt. The program was written by Simon N. Goodwin and Jon A. Smith and is available from Knighted Computers, 707 Highland St., Fulton, NY 13069, (phone 315-593-8219), for $16.50+$3.00 for s&h (any size order).

book review by Dick Wagner

Minute Manual For The Dot Matrix Printer
Author-Jim Pirisino
Publisher- Minute Ware
Eight Chapters/164 pages
Price-$12.95

The author of MINUTE MANUAL FOR THE DOT MATRIX PRINTER covers the dot matrix printer principles in 118 pages of well written text. His intent is to provide the reader with some knowledge on the subject so a suitable printer can be purchased. Also, he provides a very good background for printer use. Printer features include: print quality, types of print, character sets as graphics and foreign, line spacing and form control. He also goes into printing speed and tests, IBM compatability, noise, and the ability to handle forms.

Very little technical information is given on interfacing. The author does cover the need for interfacing and brings out that this should be considered "part of the computer cost". Some computers come equipped with parallel and/or serial interfacing built in.

Chapters 5 and 6 are probably the meat of the book in that they cover the subject of printer codes, those mysterious numbers and symbols that make the printer recognize computer commands, are discussed in detail. Probably all of the commonly available 80 column printers use ESC as part of the code system. At least the printer manufacturers have agreed on this, if not on the number codes. ESC is generated by a special key on the computer that changes the meaning of a character, so that the printer itself will recognize it as special.

Our 2068 computers do not have the ESC feature, so we are dependent on software to work it out. There are probably knowledgeable people who know how to implant ESC into a 2068 program using LPRINT or COPY to do certain commands such as double-width, ect.

The author uses specific comparisons to show how various makes of printers, even different models, differ in such things as type shape, what they can and cannot do, and the problem of combining printers with computers that don't use the same methods for LPRINT, ect.

The remaining 45 pages are used in covering in detail certain models of Epson, Gemini, NEC, Okidata, Apple and Prowriter printers. Some comparison is made betwee certain models of the same make to show differences. The book ends with a comparison chart that the reader can fill out for any printer being considered for purchase.

I was in need of "printer education", after purchasing an Olivetti printer and this book was a great help in deciphering the user manual. This book can help you select a printer and operate it. After all, printers are a specialty, and very little information has surfaced for a person to use in operating a printer.

USERS GROUP UPDATE

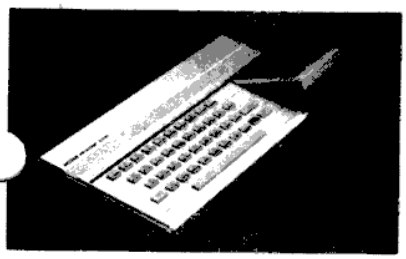
If your Timex/Sinclair Users Group hasn't been listed in TIME DESIGNS before, such as the directory in the March/April 85 issue, or an update...please send us the information so that we can mention you. We hav added new members to groups because of this listing. Here are some additional ones to add to your list:

Richmond Area Timex/Sinclair Users Group
4201 Old Hundred Rd.
PO Box 325
Chester, VA 23831
Contact: Walter E. Styles

TAS BAM User's Group, Inc.
PO Box 644
Safety Harbor, FL 33572
publishes newsletter "Keyboards"

Starting a new T/S Group in Philadelphia
Contact: Darryl L. Butler
D.L.B. Enterprises
PO Box 53490
Philadelphia, PA 19105

Waterloo/Wellington (Ontario, Canada)
Timex/Sinclair User's Group
645(B) Silverbirch Rd.
Waterloo, Ontario
Canada
N2L 4R4
Contact: Brett Lidstone



2068/SPECTRUM WARES

First of all, some user correspondence:

Bob Welburn of Lake Worth, FL writes, "I purchased an emulator from Jack Keene, Dallas, TX, and found it to be terrific! Simply insert in the T/S 2068 cartridge port. It has it's own on/off switch with LED indicator light. Good buy for $35."

Syd Wyncoop of Portland, OR writes, "I have just received a new adventure puzzle from Software Supermarket, titled EVERYONE'S A WALLY. It is even better than WALLY for those of you familiar with the first version...by mistake, I found out it runs on the [stock] 2068. I then investigated WALLY, and found it also runs on the [stock] 2068."

Also, Dave Maccarone of Damco Enterprises sent the letter that appears at the bottom/right hand column of this page.

In the "What's New?" Dept.: Bob Dyl reports that he is holding a free give-away for all members of his EMC software club. The prize? A brand new Spectrum! Also, Bob reported that Doug Dewey's Sinclair Microdrive Adapter board will be encased (in a plastic box). "ARTWORX", a graphics design software package, that has been previously offered for the T/S 2068 here in the U.S., is now available in a Spectrum version. To contact Bob Dyl, to receive additional details on his products and software club, write or call- English Micro Connection, 15 Kilburn Court, Newport, RI 02840, (401) 849-3805.

Damco Enterprises has a new emulator/peripheral adapter combination called the "Rainbow plus Interface". One module that plugs into the back of the 2068 will give the user both Spectrum emulation (with an on/off switch), and rear-card interfacing for Spectrum out-board equipment.

Two new items are available for Rotronics Wafadrive owners. The first one is a 35 page booklet entitled "Engineering Bulletin". It has chapters that cover info not included in the original user's guide. or example, routines to assist in making copies of Tasword and Masterfile on Wafadrive. The booklet is priced at $4.50 and includes postage and future updates. The second item is a fully-automatic tape transfer utility program called "Trans-Express". It is reported to allow the user to make copies of commercial programs on cassette tape, to the wafar format. It is priced at $19.95. Both items are available from Damco.

Russell Electronics (RD 1, Box 539, Centre Hall, PA 16828) has a "Gamesmate Joystick Interface" for $19.95. It plugs into the 2068 cartridge port, and works with Spectrum software that has the Kempston joystick option. Use any joystick for the 2068 (Atari-style).

In Search Of Trivial Facts Dept.: Sept. '85 "Computer Buyer's Guide" reports that there are now "nearly 3,000 programs for the Commodore 64". Hold that Phone! A 2068/Spectrum has over 5,500 software programs to choose from.

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AN OPEN LETTER TO POTENTIAL WAFADRIVE OWNERS.

It has been brought to our attention, that there have been a number of false rumors regarding the difficulties and problems with the WAFADRIVE system being placed on the various bulletin board services and news letters. We have recently learned that the injustises being placed on the WAFADRIVE have been created by distributors and manufactures of storage systems envious of the features of the WAFADRIVE. We at DAMCO would never use this type of deception to slander a competitors product.

Here at DAMCO we have been hard at work to provide our customers with continuing support. We are constantly working with ROTRONICS as well as other English companies to obtain the latest information on the WAFADRIVE and related products.

We currently have available to our customers a fully automatic transfering program allowing almost all programs to be easily transfered from cassette to wafer. We have also compiled a 36 page manual full of tips and programs from England designed to keep owners up to date with the latest information.

The WAFADRIVE has received numerious awards including "PERIPHERAL OF THE YEAR" by the Computer Trades Association. It was prefered over the Sinclair Microdrives by one English magazine, and voted "BEST BUY" by another.

But, if you still have any questions or doubts, please write us. Or better yet ask the major Timex magazines. They all own a WAFADRIVE and have given it very favorable reviews. Don't be mislead by these false rumors. The WAFADRIVE system has a lot going for it and is undeserving of this type of unethical tactics.

Sincerely,

Dave Maccarone
DAMCO ENTERPRISES

SPECTRUM SOFTWARE

AMERICAN FOOTBALL

reviewed by Tim Woods

I obtained this program because it sounded like a good "warm-up" for a certain interest (or "habit" as some may like to call it) that I have in the Fall. You may have guessed by now, that it is Pro Football, but I will not bore you with details about my favorite team (except that they are from the northwest, wear blue jerseys, and made it to the play-offs last year!).

AMERICAN FOOTBALL is a Spectrum program on cassette that is published by the Argus Press Software Group (ZX Computing). What makes this program sort of unique, is that the British are just now starting to appreciate our brand of "football". They even have organized minor league teams to root for. I remember watching a TV news interview with some English youth that were playing the game of football (non-soccer version) in a neighborhood lot. The broadcaster asked, "How do you like the game?" One very muddy-appearing young man spoke up, "We love it...but we don't understand it!" Indeed, the program American Football comes with a 16 page guide entitled "A Guide To Understanding American Football". The wording is sometimes a bit odd.

The game of American Football itself, is similar to a program that used to be on the Timex label for the T/S 1000 called "Strategy Football". This version is much more sophisticated. To "play", you must choose from a menu what offensive or defensive move you would like to make. The key to winning, is to try and "outguess" what play your opponent will try and go for. Your opponent can either be a friend or the computer itself.

The action on the screen is simulated by tiny pixel-ated players. One of the problems with this game, is that the opposing teams don't "huddle" facing each other, but rather on the sides of the field.

A lot of work has gone into making this game authentic. It is played from the view of a team coach (or like one of those guys that sit up in the box seats with headphones on). With a set number of plays to choose, the game becomes predictable after awhile. I think that I would opt for a type of computer football game that is in 3-D like the "MATCH POINT" soccer game.

Over-all, AMERICAN FOOTBALL is an interesting package with nice screen displays and a lot of little extras...and at a good price too!

Available from: The English Micro Connection, 15 Kilburn Court, Newport, RI, 02840, for $13.95+$1.00 for postage.

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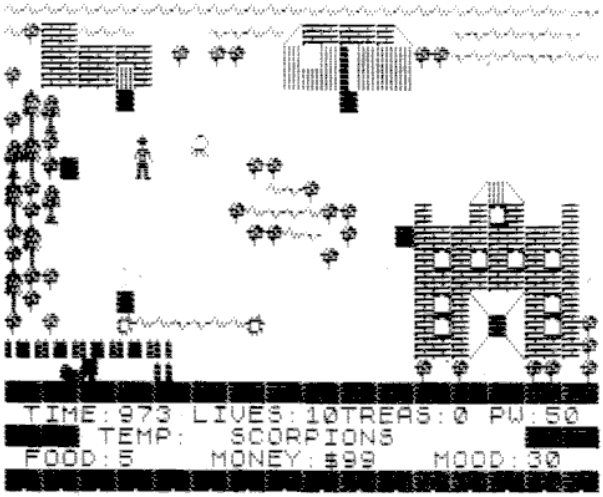

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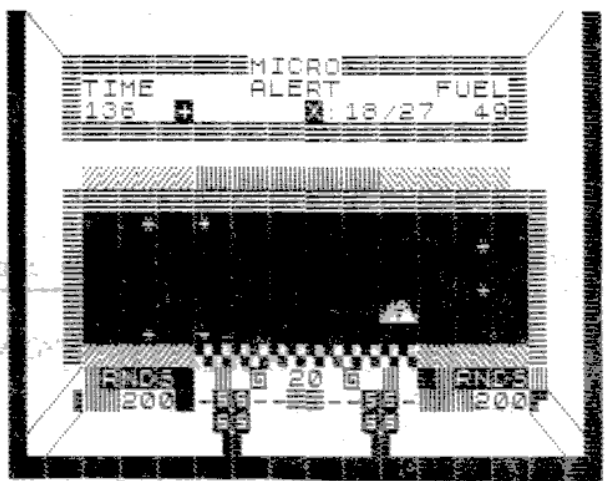

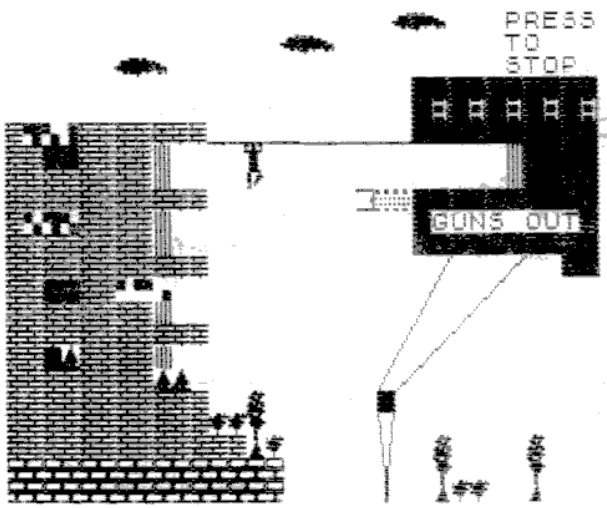

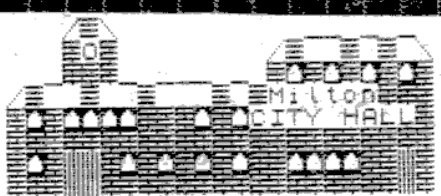

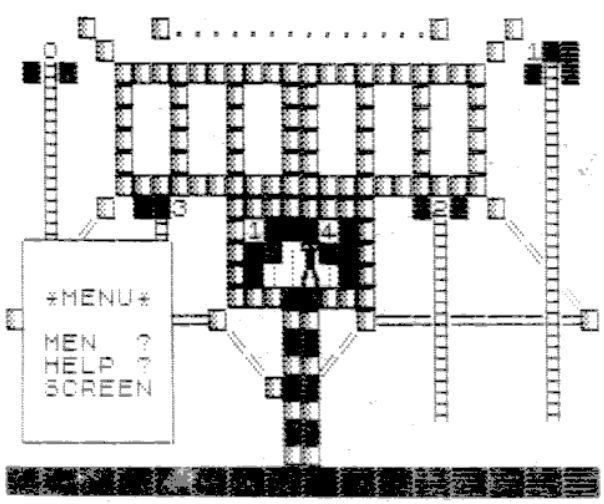

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Make a quantum leap in your processing power with JRC BASIC COMPILER.

and 2068 TWO PASS Z80 ASSEMBLER

The Z80 ASSEMBLER uses a full two passes, so the conveniencesyou normally associate with a good assembler are all here. There is full use of LABELS so you never have to worry about jump addresses or where a piece of data might be. The assembler can also handle simple expression evaluation which takes work off the programmer. Although there are many assemblers available for the 2068, very few are as easy to use as the JRC Z80 ASSEMBLER. Entering and editing you mnemonics are easy since there are multiple statements per line and comments can be put anywhere.

****
**********JRC TIPS**********
****

TAPE UNLOCKER for the 2068:
MERGE "". This easily slops automatic run. If you find yourself in an input that you can't get out of then type:
USR 15002

Have you noticed that while in the command mode you can type commands after "LOAD"? That way you can have the computer BEEP, SAVE OR LOAD SOMETHING ELSE after the first load.

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1 *** EASY EDITOR ***
(.for the TIMEX COLOR COMPUTER.)

Up till now, JRC SOFTWARE, has disliked text editors written in BASIC. Since they use string handling functions, you get an annoying delay between each keystroke. Letters get missed. These editors also greatly limit how much of your memory can be dedicated to text. So typing long papers may be impossible.

The JRC SOFTWARE EASY EDITOR, however, is based on a completely different concept than other editors. It is probably the fastest, most efficient, and easiest text editing system ever written in BASIC. It also has some interesting features for ease of use, such as a bold character option for the 2040 printer. JRC will adapt to your brand of printer if necessary!

2 ***TOUCH TYPE LEARNING GAME***

Even if you're not a typist now, you can learn to touch type on the 2068. This program will introduce you to 197 symbols and keep track of your progress on each. Weak keys are reviewed more often than others. With practice you will be able to touch type BASIC programs, which is much easier and handier than the "hunt and peck" method.

Although this may be one of the most practical and educational programs you can buy for the 2068, keep in mind that it is a GAME and a fun one too. There is even an option for kids that just teaches the use of the keyboard without home-row drills. You and your family won't tire of this program overnight.

3 ***HI-RES LANDER***

Why settle for games that use block graphics? The JRC SOFTWARE version of the classic lunar lander features a ship that moves pixel by pixel. With that kind of realism, you have to have a soft touch to land. Plus patience. And it gets harder every round! Fortunately for novice astronauts, there are two levels. There is the regular "hard" option and an "easy" option intended for children. (But you can practice on 'easy' when no one is looking.)

4 *** THREE GAMES PACKAGE ***

Paint and draw with COLORSKETCH. Use your joystick and over a dozen single keystroke commands. Save and load screens easily.

How good are you at avoiding TIMY THE TRASH COMPACTOR? Can you eat all the garbage before he gets you? The large animated characters will entertain children, but adults will get some fun out of it too.

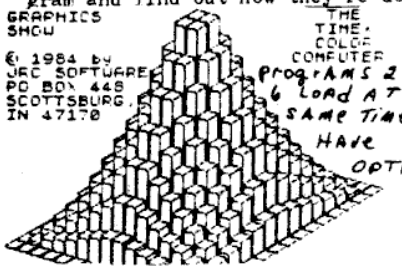
Do you like challenge? DODGE'EM is a fast and difficult race game. Gets progressively harder to master and remembers highest five scores. Plus JRC SOFTWARE added a new surprising twist to this classic race game.

5 *** OSCILLOSCOPE ***

This was a big hit on the 1000. Now it's available for the 2068! It isn't every day that you see real time three dimensional rotation. Although the OSCILLOSCOPE program isn't a real working oscilloscope, it does have similar displays and dozens of patterns are possible. The main difference is that JRC SOFTWARE added a third dimension to the view. Impress everyone with the capability of your TIMEX computer!

6 *** THE GREAT GRAPHICS SHOW ***

Every type of graphics demonstration that can be imagined, from flashing displays to three dimensional cities, has been put together in one fascinating and eye catching program. Explore the 2068 in ways not thought possible. Rather than spending months doing these yourself, you can buy the program and find out how they're done!



BANK SWITCHING OPERATING SYSTEM FOR THE ZX81/TS1000

*** USE THE 48 TO 64K BLOCK OF MEMORY FOR BASIC PROGRAMS ***

*** CREATE A "VIRTUAL MEMORY" SYSTEM ***

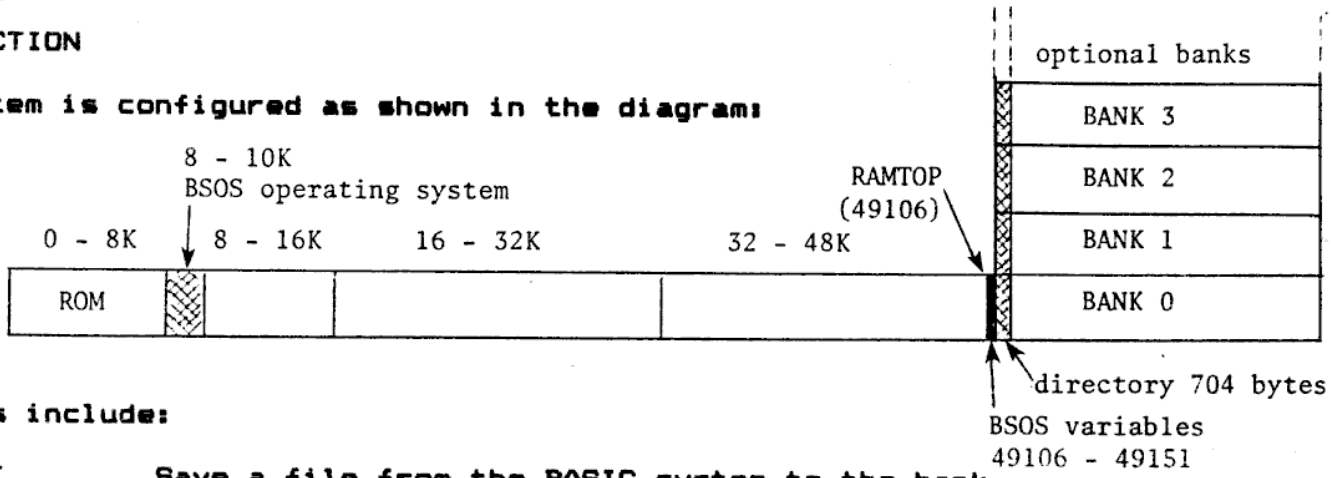
*** AS DESCRIBED IN T S HORIZONS (March 1984 through March 1985) ***

*** USE WITH A 64K RAM PACK ***

*** OR BUILD A BANK-SWITCHED SYSTEM WITH LIMITLESS MEMORY ***

INTRODUCTION

The system is configured as shown in the diagram:



Commands include:

SAVE	**Save a file from the BASIC system to the bank**
LOAD	**Load a file back from the bank into the BASIC system**
PURGE	**Purge a file from the bank**
RECLAIM	**Clear variables or a program (or part) from the BASIC system**
PACK	**Repack the contents of the bank**
BANK	**Change from one bank to another**
ROOM	**Determine space available in a bank**
QUIT	**Return to Sinclair BASIC system**

A sample directory listing the contents of a bank is shown on the right. Some of the routines in BSOS can be called from within a BASIC program to create a virtual memory system -- so you can have a program larger than 16K or a huge data file. A virtual memory system allows the program to change while it is running.

The program on the tape will transfer the operating system to the 8-10K block; reset RAMTOP to 49106; and load a directory (and any routines already in the bank). The tape is available for $10 ppd from:

HUNTER
1630 FOREST HILLS DRIVE
OKEMOS, MICHIGAN 48864

```
BANK 1 DIRECTORY
********************************
NO.   NAME     .EXT  ADDR  SIZE
---   ----     ----  ----  ----
A: DIRECTORY  .DIR:49152:00704:
B: SAVEROUTINE.PRG:49856:00134:
C: DEC-TO-HEX .PRG:49990:00308:
D: HEX-TO-DEC .PRG:50298:00134:
E: CONVERSION .PRG:50432:00750:
F:
G:
H:
I:
J:
K:
L:
M:
N:
O:
********************************
1:SAVE  3:PURGE   5:PACK  7:ROOM
2:LOAD  4:RECLAIM 6:BANK  8:QUIT
```

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